

Be

#11



PCT09

RAW SEQUENCE LISTING

DATE: 02/06/2002

PATENT APPLICATION: US/09/674,337A

TIME: 14:15:13

Input Set : A:\55107sequence.txt

Output Set: N:\CRF3\02062002\I674337A.raw

P.S

4 <110> APPLICANT: Satoshi MORI
 5 Kyoko Higuchi
 7 <120> TITLE OF INVENTION: NICOTIANAMINE SYNTHASE AND GENE ENCODING
 8 THE SAME
 10 <130> FILE REFERENCE: 55107 (71526)
 12 <140> CURRENT APPLICATION NUMBER: 09/674,337A
 13 <141> CURRENT FILING DATE: 2002-01-07
 15 <150> PRIOR APPLICATION NUMBER: PCT/JP99/02305
 16 <151> PRIOR FILING DATE: 1999-04-30
 18 <160> NUMBER OF SEQ ID NOS: 22
 20 <170> SOFTWARE: FastSEQ for Windows Version 3.0
 22 <210> SEQ ID NO: 1
 23 <211> LENGTH: 328
 24 <212> TYPE: PRT
 25 <213> ORGANISM: Hordeum vulgare L.
 27 <400> SEQUENCE: 1

ENTERED

28 Met Asp Ala Gln Asn Lys Glu Val Ala Ala Leu Ile Glu Lys Ile Ala
 29 1 5 10 15
 30 Gly Ile Gln Ala Ala Ile Ala Glu Leu Pro Ser Leu Ser Pro Ser Pro
 31 20 25 30
 32 Glu Val Asp Arg Leu Phe Thr Asp Leu Val Thr Ala Cys Val Pro Pro
 33 35 40 45
 34 Ser Pro Val Asp Val Thr Lys Leu Ser Pro Glu His Gln Arg Met Arg
 35 50 55 60
 36 Glu Ala Leu Ile Arg Leu Cys Ser Ala Ala Glu Gly Lys Leu Glu Ala
 37 65 70 75 80
 38 His Tyr Ala Asp Leu Leu Ala Thr Phe Asp Asn Pro Leu Asp His Leu
 39 85 90 95
 40 Gly Leu Phe Pro Tyr Tyr Ser Asn Tyr Val Asn Leu Ser Arg Leu Glu
 41 100 105 110
 42 Tyr Glu Leu Leu Ala Arg His Val Pro Gly Ile Ala Pro Ala Arg Val
 43 115 120 125
 44 Ala Phe Val Gly Ser Gly Pro Leu Pro Phe Ser Ser Leu Val Leu Ala
 45 130 135 140
 46 Ala His His Leu Pro Glu Thr Gln Phe Asp Asn Tyr Asp Leu Cys Gly
 47 145 150 155 160
 48 Ala Ala Asn Glu Arg Ala Arg Lys Leu Phe Gly Ala Thr Ala Asp Gly
 49 165 170 175
 50 Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu Thr
 51 180 185 190
 52 Gln Glu Leu Gly Ala Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly
 53 195 200 205
 54 Met Ala Ala Glu Glu Lys Ala Lys Val Ile Ala His Leu Gly Ala His

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55      210      215      220
56 Met Val Glu Gly Ala Ser Leu Val Val Arg Ser Ala Arg Pro Arg Gly
57 225      230      235      240
58 Phe Leu Tyr Pro Ile Val Asp Pro Glu Asp Ile Arg Arg Gly Gly Phe
59      245      250      255
60 Glu Val Leu Ala Val His His Pro Glu Gly Glu Val Ile Asn Ser Val
61      260      265      270
62 Ile Val Ala Arg Lys Ala Val Glu Ala Gln Leu Ser Gly Pro Gln Asn
63      275      280      285
64 Gly Asp Ala His Ala Arg Gly Ala Val Pro Leu Val Ser Pro Pro Cys
65      290      295      300
66 Asn Phe Ser Thr Lys Met Glu Ala Ser Ala Leu Glu Lys Ser Glu Glu
67 305      310      315      320
68 Leu Thr Ala Lys Glu Leu Ala Phe
69      325
71 <210> SEQ ID NO: 2
72 <211> LENGTH: 1295
73 <212> TYPE: DNA
74 <213> ORGANISM: Hordeum vulgare L.
75 <400> SEQUENCE: 2
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78 gccagaaca aggaggtcgc tgctctgatc gagaagatcg ccggtatcca ggccgccatc 120
79 gccgagctgc cgtcgtgag cccgtcccc gaggtcgaca ggctcttcac cgacctcgtc 180
80 acggcctgcg tccgcgcgag cccgctcgac gtgacgaagc tcagcccgga gcaccagagg 240
81 atgcgggagg ctctcatccg cttgtgtctc gccgcccagg ggaagctcga ggcgcactac 300
82 gccgacctgc tcgccacct cgacaaccgc ctcgaccacc tcggcctctt cccgtactac 360
83 agcaactacg tcaacctcag caggctggag tacgagctcc tggcgcgcca cgtgccgggc 420
84 atcgcgccgg cgcgcgtcgc ctctcgtcgc tccggcccgc tgccgttcag ctcgctcgtc 480
85 ctcgccgcgc accacctgcc cgagaccag ttcgacaact acgacctgtg cggcgcgggc 540
86 aacgagcgcg ccaggaagct gttcggcgcg acggcggacg gcgtcggcgc gcgtatgtcg 600
87 ttccacacgg cggacgtcgc cgacctcacc caggagctcg gcgcctacga cgtggtcttc 660
88 ctcgccgcgc tcgtcggcat ggcagccgag gagaaggcca aggtgattgc ccacctgggc 720
89 gcgcacatgg tggagggggc gtccctggtc gtgcggagcg cacggccccg cggttttctt 780
90 taccctattg tcgacctgga ggacatcagg cggggtgggt tcgaggtgct ggccgtgcac 840
91 caccgggaag gtgaggtgat caactctgtc atcgtcgccc gtaaggccgt cgaagcgag 900
92 ctcaagtggc cgcagaacgg agacgcgcac gcacggggcg cggtgccgtt ggtcagcccg 960
93 ccatgcaact tctccaccaa gatggaggcg agcgcgcttg agaagagcga ggagctgacc 1020
94 gccaaagagc tggccttttg attgaagagt gcgcgtggtc attctgtcgc ctgcgatcgt 1080
95 ggtaactttc ctactcgtgt gtgttttgat gtttgtgcct gtaagagtta tgcttcggc 1140
96 cttgtgctgt taatttacac gcgttacatg tagtacttgt atttatacct ggaataacgg 1200
97 tatgtaacat aaatattagt gggatttgaa gtgtaatgct aaataataag aaaacttgat 1260
98 gcagacattc aaaaaaaaaa aaaaaaaaaa aaaaa 1295
100 <210> SEQ ID NO: 3
101 <211> LENGTH: 335
102 <212> TYPE: PRT
103 <213> ORGANISM: Hordeum vulgare L.
105 <400> SEQUENCE: 3
106 Met Ala Ala Gln Asn Asn Gln Glu Val Asp Ala Leu Val Glu Lys Ile
107 1 5 10 15

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108 Thr Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro Ser
109          20          25          30
110 Pro Asp Val Asp Ala Leu Phe Thr Glu Leu Val Thr Ala Cys Val Pro
111          35          40          45
112 Pro Ser Pro Val Asp Val Thr Lys Leu Gly Pro Glu Ala Gln Glu Met
113          50          55          60
114 Arg Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu Glu
115          65          70          75          80
116 Ala His Tyr Ser Asp Met Leu Ala Ala Phe Asp Lys Pro Leu Asp His
117          85          90          95
118 Leu Gly Met Phe Pro Tyr Tyr Asn Asn Tyr Ile Asn Leu Ser Lys Leu
119          100         105         110
120 Glu Tyr Glu Leu Leu Ala Arg Tyr Val Pro Gly Gly Tyr Arg Pro Ala
121          115         120         125
122 Arg Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Phe Val
123          130         135         140
124 Leu Ala Ala Arg His Leu Pro Asp Thr Met Phe Asp Asn Tyr Asp Leu
125          145         150         155         160
126 Cys Gly Ala Ala Asn Asp Arg Ala Ser Lys Leu Phe Arg Ala Asp Arg
127          165         170         175
128 Asp Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu
129          180         185         190
130 Ala Gly Glu Leu Ala Lys Tyr Asp Val Val Phe Leu Ala Ala Leu Val
131          195         200         205
132 Gly Met Ala Ala Glu Asp Lys Ala Lys Val Ile Ala His Leu Gly Ala
133          210         215         220
134 His Met Ala Asp Gly Ala Ala Leu Val Val Arg Ser Ala His Gly Ala
135          225         230         235         240
136 Arg Gly Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly
137          245         250         255
138 Gly Phe Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn
139          260         265         270
140 Ser Val Ile Ile Ala Gln Lys Ser Lys Asp Val His Ala Asp Gly Leu
141          275         280         285
142 Gly Ser Gly Arg Gly Ala Gly Gly Gln Tyr Ala Arg Gly Thr Val Pro
143          290         295         300
144 Val Val Ser Pro Pro Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr
145          305         310         315         320
146 Gln Asn His Lys Arg Asp Glu Phe Ala Asn Ala Glu Val Ala Phe
147          325         330         335
149 <210> SEQ ID NO: 4
150 <211> LENGTH: 1342
151 <212> TYPE: DNA
152 <213> ORGANISM: Hordeum vulgare L.
154 <400> SEQUENCE: 4
155 ctctgtgcc tgtcctgagg taccaagaac accagtgaac tggctgcca gaacaaccag      60
156 gaggtggatg ccttggtgga gaagatcacc gggctccatg ccgcaatcgc caagctgccg      120
157 tcgctcagcc catccccgga cgtcgacgcg ctcttcacgg agctgggtcac ggcgtgcgtt      180
158 ccaccgagtc cagtggacgt gaccaagctc gggccggagg cgcaggagat gcgggagggc      240

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159  ctcatccgcc  tatgtctccga  ggccgagggg  aagctggagg  cgcactactc  cgacatgctc  300
160  gccgccttcg  acaagccgct  ggatcacctc  ggcatgttcc  cctactacaa  caactacatc  360
161  aacctcagca  agctcgagta  cgagctcctg  gcccgctacg  tgccctggcg  ctatcgcccg  420
162  gcgcgcgtcg  cgttcatcgg  ctccggcccc  ctgccgttca  gtccttttgt  cctggcccg  480
163  cgcacactgc  ccgacaccat  gttcgacaac  tatgacctgt  gcggtgcggc  caacgatcgc  540
164  gccagcaagc  tcttccgcgc  ggatcgcgac  gtgggtgccc  gcatgtcgtt  ccacacggcc  600
165  gacgtcgcgg  acctcgccgg  cgagctcgcc  aagtacgacg  ttgtcttctc  ggccgcactc  660
166  gtcggcatgg  ccgccgagga  caaggcgaag  gtgatcgcgc  acctcgccgc  acacatggca  720
167  gacggggcgg  ccctcgtcgt  gcgcagcgca  caccggagcg  gcgggttctc  gtacccgatc  780
168  gtcgaccccc  aggacatcgg  ccgaggcggg  ttcgaggtgc  tggccgtgtg  ccatcccgac  840
169  gacgacgtgg  tgaactccgt  catcatcgca  cagaagtcca  aggacgtgca  tgccgatgga  900
170  cttggcagcg  ggcgtggtgc  cggtggacag  tacgcgcggg  gcacggtgcc  tgttgtcagc  960
171  cccccgtgca  ggttcggcga  gatggtggcg  gacgtgaccc  agaaccacaa  gagagacgag  1020
172  tttgccaacg  ccgaagtggc  cttttgatcg  ttcgctgcga  ggggtgtgat  ccatgatcca  1080
173  tccatacctc  gttctgtgat  tgcataaagc  ttgcaatcgt  atgcatttca  agtcacgtgt  1140
174  tgcttctatc  caataatgta  cgtgtggtgt  ttacacgcga  atgtcttgta  gacctttgta  1200
175  tgtgtacaag  tgaattttaa  ttcacaagta  catataatgg  tcaccattga  aaagatgttt  1260
176  agtgtgtgtt  ttccaatata  tgtttgtgta  aggttcatca  tctaataaaa  tatgtttgga  1320
177  acccaaaaaa  aaaaaaaaaa  aa  1342
179 <210> SEQ ID NO: 5
180 <211> LENGTH: 335
181 <212> TYPE: PRT
182 <213> ORGANISM: Hordeum vulgare L.
184 <400> SEQUENCE: 5
185 Met Ala Ala Gln Asn Asn Asn Lys Asp Val Ala Ala Leu Val Glu Lys
186 1 5 10 15
187 Ile Thr Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro
188 20 25 30
189 Ser Pro Asp Val Asp Ala Leu Phe Thr Glu Leu Val Thr Ala Cys Val
190 35 40 45
191 Pro Pro Ser Pro Val Asp Val Thr Lys Leu Gly Pro Glu Ala Gln Glu
192 50 55 60
193 Met Arg Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu
194 65 70 75 80
195 Glu Ala His Tyr Ser Asp Met Leu Ala Ala Phe Asp Asn Pro Leu Asp
196 85 90 95
197 His Leu Gly Ile Phe Pro Tyr Tyr Ser Asn Tyr Ile Asn Leu Ser Lys
198 100 105 110
199 Leu Glu Tyr Glu Leu Leu Ala Arg Tyr Val Arg Arg His Arg Pro Ala
200 115 120 125
201 Arg Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Phe Val
202 130 135 140
203 Leu Ala Ala Arg His Leu Pro Asp Thr Met Phe Asp Asn Tyr Asp Leu
204 145 150 155 160
205 Cys Gly Ala Ala Asn Asp Arg Ala Ser Lys Leu Phe Arg Ala Asp Thr
206 165 170 175
207 Asp Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu
208 180 185 190
209 Ala Ser Glu Leu Ala Lys Tyr Asp Val Val Phe Leu Ala Ala Leu Val

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```

210          195          200          205
211 Gly Met Ala Ala Glu Asp Lys Ala Lys Val Ile Ala His Leu Gly Ala
212          210          215          220
213 His Met Ala Asp Gly Ala Ala Leu Val Val Arg Ser Ala His Gly Ala
214 225          230          235          240
215 Arg Gly Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly
216          245          250          255
217 Gly Phe Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn
218          260          265          270
219 Ser Val Ile Ile Ala Gln Lys Ser Lys Glu Val His Ala Asp Gly Leu
220          275          280          285
221 Gly Ser Ala Arg Gly Ala Gly Arg Gln Tyr Ala Arg Gly Thr Val Pro
222          290          295          300
223 Val Val Ser Pro Pro Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr
224 305          310          315          320
225 Gln Asn His Lys Arg Asp Glu Phe Ala Asn Ala Glu Val Ala Phe
226          325          330          335
228 <210> SEQ ID NO: 6
229 <211> LENGTH: 1314
230 <212> TYPE: DNA
231 <213> ORGANISM: Hordeum vulgare L.
233 <400> SEQUENCE: 6
234 ctacttcact cacactagtgc cccagaaaga aggctgcaat ggctgcccag aacaacaaca      60
235 aggatgtcgc tgccctgggtg gagaagatca ccgggctcca cgccgccatc gccaaagctgc      120
236 cgtcgctcag cccatccccg gacgtcgacg cgctcttcac cgagctgggtc acggcggtgcg      180
237 ttcccccgag ccccggtggac gtgaccaagc tcggccccga ggcgcaggag atgcgggagg      240
238 gcctcatccg cctctgctcc gagggcgagg ggaagctgga ggcgactac tccgacatgc      300
239 tcgccgcctt cgacaacccg ctggatcacc tcggcatctt cccctactac agcaactaca      360
240 tcaacctcag caagctggag tacgagctcc tggcacgcta cgtccggcgg catcgcccgg      420
241 ccgcgctcgc gttcatcggc tccggcccgc tgccgttcag ctcccttgtc ctggccgcgc      480
242 gccacctgcc cgacaccatg tttgacaact acgaccttg cggcgcggcc aacgatcgcg      540
243 ccagcaagct cttccgcgcg gacacggacg tgggtgcccg catgtcgttc cacacggccg      600
244 acgtcgcgga cctcgccagc gagctcgcca agtacgacgt cgtcttcctg gccgcgctcg      660
245 tcggcatggc cgccgaggac aaggccaagg tgatcgcgca cctcggcgca cacatggcag      720
246 acggggcggc cctcgctcgtg cgcagcgcac acggagcgcg cgggttcctg tacccgattg      780
247 tcgacccccca ggacatcggc cgcggcgggg tcgaggtgct ggccgtgtgc caccgcgacg      840
248 acgacgtggt gaactccgtc atcatcgcac agaagtccaa ggaggtgcat gccgatggac      900
249 ttggcagcgc gcgtggtgcc ggtcgacagt acgcgcgcgg cacggtgccg gttgtcagcc      960
250 ccccggtcag gttcggtgag atggtggcgg atgtgaccca gaaccacaag agagacgagt      1020
251 ttgccaacgc cgaagtggcc ttttgatcga tcgtcgccaa gggacaataa atgaacgtgg      1080
252 atgtggtagg gtaatttgcc tacctcgctg cttgatcgct tgcaatatgt gcacattttc      1140
253 ctactaccgc tgettatgca tttcaagcca tgtgatgttg gtatccaata aagtatgtgt      1200
254 agggtttaca cgcaaagtgc tttacacctt gtacgtgtaa gtgttgacaa cgatgaattt      1260
255 cagttcacaa ttaataaata gtataatgga ttcaaaaaaa aaaaaaaaaa aaaa      1314
257 <210> SEQ ID NO: 7
258 <211> LENGTH: 329
259 <212> TYPE: PRT
260 <213> ORGANISM: Hordeum vulgare L.
262 <400> SEQUENCE: 7

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FBI

Use of n and/or Xaa has been detected in the Sequence Listing.
 To view the Sequence Listing to insure a corresponding
 explanation is presented in the <220> to <223> fields of
 each sequence using n or Xaa.

VERIFICATION SUMMARY

PATENT APPLICATION: US/09/674,337A

DATE: 02/06/2002

TIME: 14:15:14

Input Set : A:\55107sequence.txt

Output Set: N:\CRF3\02062002\I674337A.raw

L:13 M:271 C: Current Filing Date differs, Replaced Current Filing Date
L:541 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:14